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RANGE IMPROVEMENT

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NOTES

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(AGRI.-OGDEN)

GRAZING STEEP MOUNTAIN SLOPES

(Steep slopes not only receive slight use by livestock, but they constitute a source for sediment, rock, and debris which may affect water quality)

STATEMENT OF PURPOSE

By L. Goodwin

Assistant Professor of Range Management

This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "Notes" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies, and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

Research to Supply Information

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

GRAZING STEEP MOUNTAIN SLOPES

(Steep slopes not only receive slight use by livestock, but they constitute a source for sediment, rock, and debris and contribute to reduction in water quality)

By Dr. DuWayne L. Goodwin
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The use of mountain slopes as a source of summer feed for livestock has been a common practice, so common in fact that many livestock producers assume that a summer range allotment includes every acre within its boundaries.

In recent years as land managing agencies have attempted to evaluate range and watershed resources under their jurisdiction, they have frequently observed that some mountain slopes not only receive slight use by livestock but they also constitute a source area for sediment, rock, and debris. These contribute, if not to flooding, then at least to reduction in water quality.

As a result of these observations many mountain slopes have been or are being classified as non-usable range. In conflict with this action are the observations of livestock people who see abundant "good" forage on mountain slopes being wasted by such decisions.

Research to Supply Information

Prompted by the conflict of interpretation of observations and by the need for criteria upon which to base a decision as to the exclusion or inclusion of a mountain slope as part of the range resource area, the Utah Station in cooperation with the Range Management Division of the Forest Service and the Intermountain Forest and Range Experiment Station activated a research program to determine the effects of grazing cattle on steep mountain slopes. The study is being conducted in Cowley Canyon and Herd Hollow on land either administered by the Forest Service or owned by Leland Peterson of Hyrum, Utah.

Four two-acre pastures have been established on slopes that have a gradient varying between 23 and 68 percent. Vegetation within the pastures is typical of summer range used by cattle. Serviceberry, chokecherry, sagebrush, wheatgrass, bluegrass, fescue, and balsamroot are some of the plants present in each pasture.

Within each pasture, measurements of crown cover by species, infiltration rate, soil density, soil movement, and litter cover are being made. All measurements except infiltration and soil density are made before and after each grazing period. Infiltration and soil density are determined each spring. Behavior of cattle while in each pasture is also recorded.

Behavior of Cattle on Steep Slopes

The behavior of the cattle has been extremely interesting. Apparently the action of the animals is influenced by their recent experiences, by the proximity of other cattle, and by the gradient of the slope. Animals with a previous experience in enclosed pastures were less nervous, did less fence searching, and covered pastures more uniformly than did animals from the open range. The former appeared to be less concerned about the proximity of other cattle than did the latter.

When cattle that had been previously enclosed in small pastures were placed in a pasture with a slope of 60 percent, they immediately moved to the top of the pasture where they stayed most of the time. Animals from the range herd when placed in a pasture on a 68 percent slope stayed at the bottom of the pasture as near the range herd as they could until the range herd moved away (Figs. 1 and 2).

The influence of slope upon cattle movement was most clearly demonstrated in a single pasture in which gradients of 23, 33, and 56 percent were included. In this pasture, most activity occurred on the two slopes with least gradient. Cattle moved rather freely and uniformly covered the area of pasture with a slope of 43 percent.

Movement of Cattle Displaces Soil

As the cattle grazed the pastures, soil was loosened and displaced. The maximum and minimum vertical displacement in each pasture is presented in table 1.

Extent of soil displacement appears to be related to slope, although soil characteristics and condition of vegetation probably exert modifying influences. Changes in position of soil surface do not indicate soil loss. They are an indication of the amount of soil that has been loosened so that it could be moved downslope by gravity or water.

As cattle moved about the pastures, litter at the soil surface was displaced, shattered, or pulverized. Before-and-after photographs were used to record changes (Fig. 3).

Table 1. Changes in elevation of the soil surface following grazing of mountain slopes by cattle.

<u>Percent Slope</u>	<u>Change (inches)</u>	
	<u>Maximum</u>	<u>Minimum</u>
68	5.39	.04
60	3.04	.00
43	4.09	.00
56/33/23	2.28	.04

Protective Soil Cover Decreases

Because cattle tend to congregate in certain locations within the pastures, the effects of trampling are more pronounced in some areas than in others. However, the general effect of cattle on litter cover was to decrease the soil protection afforded by litter and rock and to increase the area of bare soil. The average increase in bare soil in pastures with slopes of 68, 60, and 56 percent was 11.8, 5.6, and 8.9 percent. Since range condition is lowered and erosion hazard increased as exposed bare soil increases, these changes in litter are not desirable. They should be minimized.

Results obtained during the first season of use in the experimental pastures indicate the direct effect of cattle on slopes. The full meaning of these effects can be determined only after several seasons of study. Observed changes in vegetation, soil, and litter must be evaluated in terms of the effects of summer storms and spring snowmelt on soil surfaces that have been disturbed.

(From UTAH SCIENCE, Vol. 23, No. 1 - March 1962)

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The dictionary is the only place in the world

where

SUCCESS comes before WORK

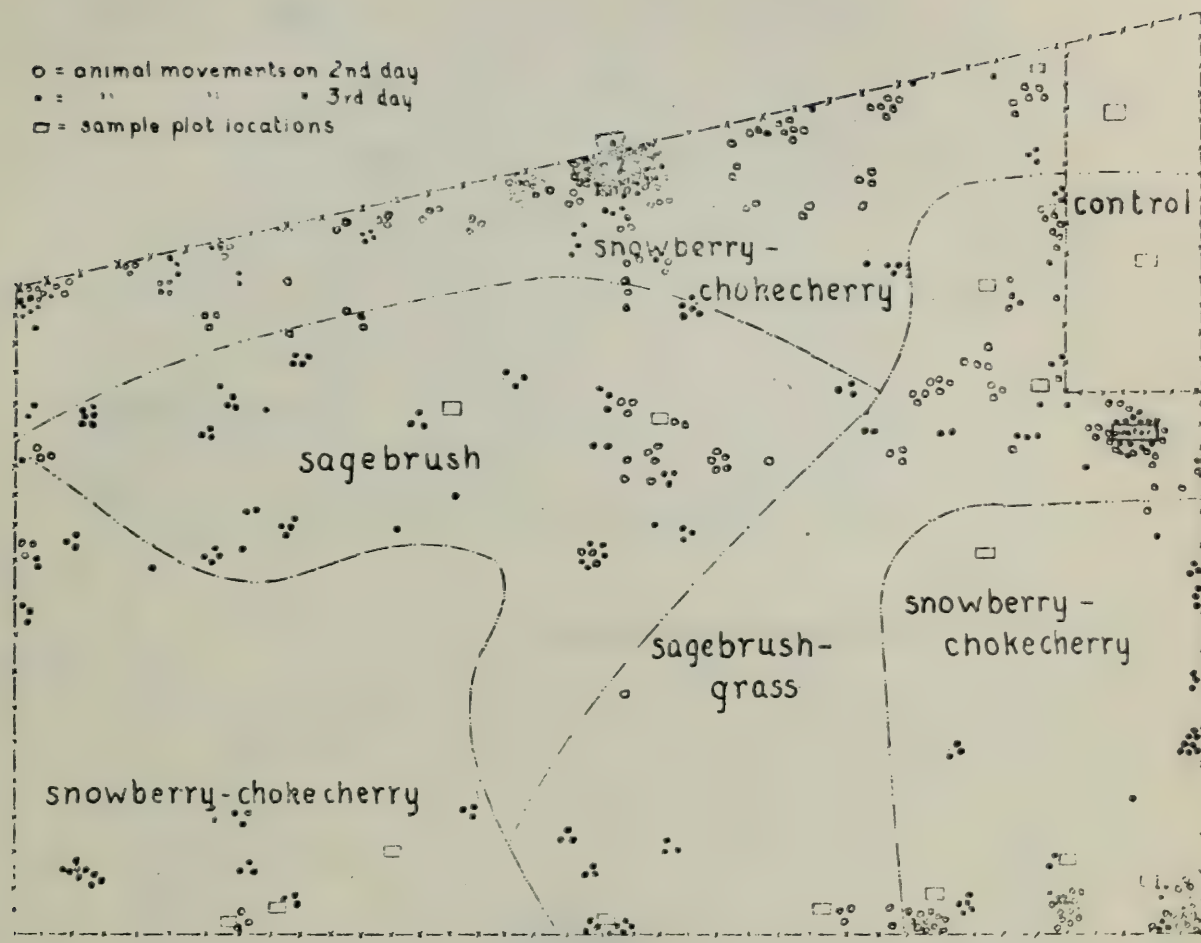


Fig. 1. Animal movements and plot locations
 in pastures on 60 percent slopes.

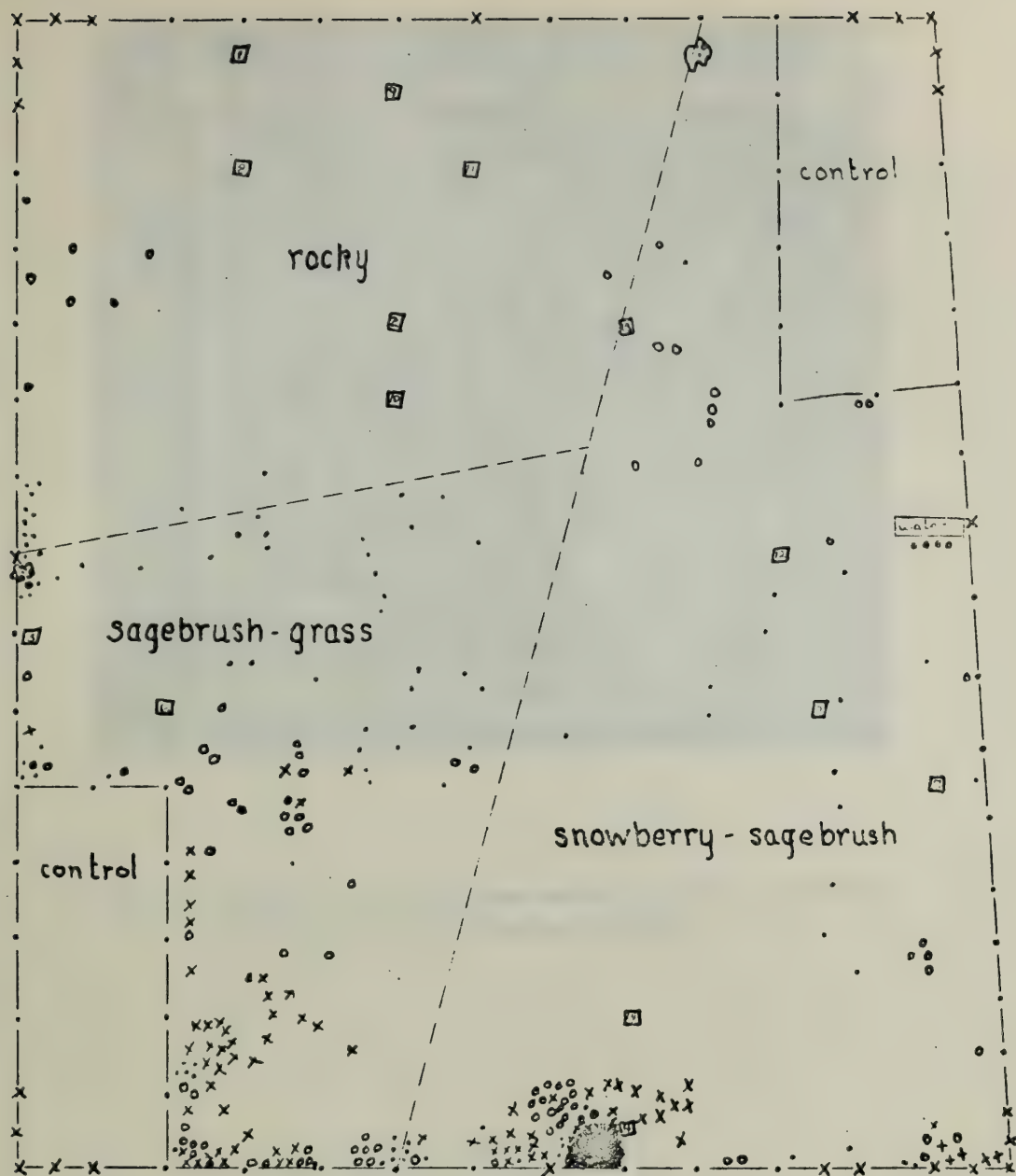


Fig. 2. Animal movements and plot locations in pasture on 68 percent slope.

□ = plot location

X = animal movements on 1st day

O = animal movements on 2nd day

. = animal movements on 3rd day



Fig. 3. Portraits of soil surfaces made it possible to measure small changes in distribution of litter.

* * * * *

SAFETY MESSAGE

Thousands die of gas

Some inhale it — Some light it

Others step on it

NUTRIENT INTAKE AND LIVESTOCK RESPONSES ON SEEDED FOOTHILL RANGES

(An abstract from the text published in
JOURNAL OF ANIMAL SCIENCE, Vol. 20, No. 1, February 1, 1961)

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Deficiency of suitable spring range in the Intermountain area generally is a limiting factor for successful livestock production. During recent years, livestock men have shown increased interest in artificial rehabilitation of depleted foothill range to provide more forage.

Considerable uncertainty exists as to the relative grazing value of the species available for planting on arid ranges. Because of differences in palatability, nutritive value, and growth habits, all species are not equally valuable for various seasons of grazing and kinds of livestock. This study was conducted to compare nutritive values of four major wheatgrass species and to measure livestock responses. The species studied were crested wheatgrass (Agropyron cristatum ^{2/}), intermediate wheatgrass (Agropyron intermedium), tall wheatgrass (Agropyron elongatum), and pubescent wheatgrass (Agropyron trichophorum).

The experimental ranges are located in west-central Utah and were formerly occupied by sagebrush and juniper with sparse amounts of an understory of annual weeds and a few scattered perennial grasses. Precipitation averages 12 to 14 inches per year and occurs principally as winter snows and early spring rains. The four grasses had been planted separately 3 to 10 years previous to the study in replicated fenced pastures and were well established.

The study was summarized as follows:

During the spring and early summer of 1956 and 1957 a study was conducted in central Utah to determine nutritive intakes and livestock gains on seeded foothill ranges.

^{1/} Research professor and head of the department of range management, Utah Agricultural Experiment Station.

^{2/} This species was a commercial purchase and contained both fairway and standard crested wheatgrass.

Four wheatgrasses were studied, crested, intermediate, tall, and pubescent. Pure stands were grazed by both cattle and sheep.

In most cases, total protein, phosphorus, and energy content of the diets decreased as the grasses matured. Lignin and cellulose increased. In general, the digestibility of all constituents decreased.

Sheep and cattle made better gains early in the season than later. Late season gains by cattle were greater on the later maturing intermediate and tall wheatgrasses than on earlier maturing crested and pubescent wheatgrasses. Intermediate and tall wheatgrasses also gave best seasonlong cattle gains. Intermediate wheatgrass gave better gains throughout the grazing season for both ewes and lambs than did tall or crested wheatgrass.

It was concluded that cattle make better use of wheatgrasses than do sheep since lactating cows generally held their body weight or gained throughout spring and early summer, whereas ewes, except those grazing intermediate wheatgrass, lost weight throughout the season. Reductions in lamb and calf gains were less with increasing forage maturity than were reductions in gains of their mothers. Gains of calves and lambs were more nearly the same on different grass species than were gains of the mothers.

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THOUGHTS ARE THINGS!

Almost all the trouble in the world is created by things people think, say, and write. Words of anger, malice, hatred, resentment, jealousy, like physical blows cause people to hit back.

OVER-BEARING, DEMANDING WORDS CREATE DETERMINED RESISTANCE

And the attitudes of mind back of them, even though we do not speak the words, are sensed by others. For the telepathic power of thought is no longer merely a theory.

THOUGHTS ARE THINGS!

THISTLE DIFFERENCES MAY INFLUENCE CONTROLS

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Canada thistle plants may look different at different locations. These differences in appearance may account for variations in the weed's response to herbicide treatments, says ARS Agronomist J. M. Hodgson.

Differences he found in Canada thistles, or creeping thistles, from 10 locations in Idaho, Montana, Washington, and Wyoming provide a basis for research on thistle control.

For example, thistle plants from Fergus, Montana are wavy-leaved; those from Gallatin, Montana are flat-leaved. Hodgson found that 2, 4-D treatments at bud stage eliminated 74 percent of the wavy-leaved growth, but only 44 percent of the flat-leaved growth.

Most of the plants were more sensitive in the bud stage than in the bloom stage to applications of 1.5 pounds of 2, 4-D per acre.

Visible differences also seem to indicate the weeds ability to survive after mechanical stress. Cultivation every 21 days eliminated 99 percent of the ruffle-leaved plants from Fremont, Idaho, and Prosser, Washington, but only 81 percent of the wavy-leaved plants from Laramie, Wyoming.

Canada thistles from different locations show other variations. The leaves may have numerous spines or a few bristles; they may be waxy and smooth or covered with fine hair on top or underneath. Flower color may vary from shades of purple to pale blue and white. There may be 300,000 to 700,000 seeds per pound.

In the Montana studies, spring emergence of annual shoot growth was consistently early in 2 of the 10 groups and late in 2 of the groups. The plants that had the earliest shoot emergence also had the earliest formation of buds and flowers. This characteristic can influence the weed's competitiveness with a crop.

An early emerging type would get an earlier start in competing with a spring wheat crop and cause greater losses than a late emerging type, Hodgson believes.

(From AGRICULTURAL RESEARCH - March 1962)

DURAR--"GRASS OF ALL TRADES"

By John L. Schwendiman
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Durability is the key word from which the name of Durar, a new persistent, reliable, long-lived, fine-leaved fescue, came. The word Durar is also derived from the word *duriuscula*, the subspecies designation of hard fescue.

Durar was developed by reselection from an old planting on the eastern Oregon Livestock Experiment Station at Union, Oregon. It was increased after comparison with many strains of chewings, Idaho and sheep fescue. It was first released as hard fescue, P-2517, in 1949 by USDA-SCS Plant Materials Centers and the Washington, Oregon and Idaho Experiment Stations. It has, since 1949, been in the seed certification program of these states.

Durar hard fescue is similar to and has many characteristics in common with native Idaho fescue, which is well known for its longevity, persistence, durability and contribution to the rangelands of the West. Durar produces abundant seed of good quality. It was selected pending development of a good, high seed-producing Idaho fescue.

Durar is also similar to native sheep fescue but has longer, smoother leaves, grows taller, has a larger seed and a more open seed head. It is less drouth resistant than Idaho or sheep fescue but more drouth resistant than chewings or creeping red fescue.

In short, Durar is a good conservation grass. It produces abundant, fine roots and long basal leaves which provide erosion resistant ground cover. When planted with alfalfa, it produces a heavy understory but does not reduce alfalfa production. When planted with crested wheat or other more rapidly developing grasses in its zone of adaptation, it eventually suppresses other grasses and makes a complete, 100 percent fescue ground cover.

Its adaptation is to well-drained soils in the Chestnut, Chernozem and Prairie soil groups in the 13 to 24-inch rainfall zones of the Northwest. In the lower rainfall zones it is usually fall planted with crested wheat-grass. In the higher rainfall zones and in the yellow pine timbered areas,

Durar hard fescue is usually spring planted with crested wheat or some other rapid developing grass to give quick ground cover. Durar seedlings are strong but develop slowly. Plants usually require from three to five years to reach maturity. When planted on soils that are eroded or low in fertility, nitrogen fertilizer is required and mulching assists establishment.

The heavy root production of Durar was verified when 6-year-old plantings were examined in dryland seedings at the Plant Materials Center at Pullman in the summer of 1946. Durar hard fescue produced more ground cover than crested wheatgrass. Root samples taken to a depth of eight inches at the end of the sixth growing season showed 3,500 pounds of air-dried roots per acre for crested and 6,000 for Durar under clipping management and under hay management where plots were cut only once each season, crested produced 4,200 while Durar produced 9,900 pounds of air-dried roots per acre.

These grassroots provide raw organic matter for the soil; roots decompose slowly; they improve soil structure; increase filtration and water-holding capacity and reduce runoff and erosion. Of some 20 dryland grasses tested, the root production of Durar hard fescue was exceeded only by that of its little brother, sheep fescue.

When seeded alone, Durar produces ground cover slowly. In a mixture of four pounds with five pounds of crested wheat, Durar was hardly noticeable the first year but it increased from 20 percent to 90 percent in a four-year period and at six years it completely suppressed the crested wheatgrass. For terraces, road cuts and other protective cover seedings this is an advantage. The more rapidly developing grass provides quick ground cover, holds the soil until the tall grass is gradually replaced by the low-growing, heavy erosion resistant turf-like sod and root mass of Durar hard fescue.

Durar was also used in mixtures with alfalfa. It was found to be compatible. It is shade tolerant. It produces ground cover and a heavy root system without competing with the alfalfa and reducing total hay production.

When an alfalfa-Durar mixture is plowed out, the total roots produced are from 50 to 250 percent more than from alfalfa alone. A greater contribution is obtained from the fescue when planted in alternate rows with alfalfa than when planted in solid seedings.

In a five-year-old alternate row planting alfalfa produced 4,000 pounds of roots per acre and hard fescue 11,000 for a mixture total of 15,000. Alfalfa alone in the same seeding produced 6,000 pounds of air-dried roots per acre. There was no difference in total hay production and the percent grass was desirably low.

In a second alternate row seeding established at the Pullman Plant Materials Center with alfalfa in 1948 and harvested for hay annually, root measurements were taken at the end of five years. The dense low growth of hard fescue covered the soil surface. The mixture averaged 14 percent grass and produced an average of 3.2 tons of hay per acre annually. Total root production of the mixture was 19,000 pounds per acre to a depth of eight inches, 57 percent of this total root production was Durar. Alfalfa alone averaged three tons of hay per acre annually with 11,000 pounds of roots at the end of the period. There was some cheatgrass invasion in pure alfalfa but none in the alfalfa-Durar mixture.

Renovation of alfalfa to kill cheatgrass is not necessary when Durar is used as an understory planting in hay fields. The cost of renovation, about \$4 per acre per year, is eliminated and clean dust-free hay can be produced.

Many field plantings sponsored by the Pullman Plant Materials Center in soil conservation districts of the Northwest have proven Durar's worth as a cover-producing grass. Plantings in a goatweed area on both prepared and unprepared seedbeds in the Kettle-Stevens Soil Conservation District in northeastern Washington were eminently successful. Although Durar started slowly, goatweed, at the end of five years on both prepared and unprepared seedbed sites, was completely suppressed.

In a similar seeding in a cheatgrass-goatweed area near Orofino, Idaho, in the Clearwater Soil Conservation District, Durar hard fescue became established and suppressed both cheatgrass and goatweed. At both locations, it was the outstanding species and one of the few successfully established and persisting 10 years after the plantings were made.

Durar has also done an outstanding job on roadside seedings, on dry ditchbanks, along the banks of farm ponds, in waste areas and as a cover under tree plantings and shelterbelts. After tree plantings have been cultivated for several years, Durar may be broadcast in the late fall or very early spring. Weed control by clipping helps hard fescue

to become established and provide an exclusive, low-growing fire-retarding cover. Seedings made on skid trails in the yellow pine and Douglas fir zones of timber areas have also been successful.

Other secondary uses for complete cover include farm airports, fence row seedings and orchard cover crops on well-drained soil. Successful seedings were made on the spoil areas and banks of a large football stadium in Spokane. After producing seed for more than 10 years, Arden Jacklin who has used it on contract areas, and sold thousands of pounds of seed, calls it "a grass of all trades."

Seed is available both as certified, and as foundation seed stock which can be obtained through the USDA Plant Materials Center, Pullman, Washington, or through various state crop improvement associations. Seed production and culture are very much like that of chewing fescue. Seed production is high, requires nitrogen fertilizer and can be maintained over a period of years.

When used with alfalfa, Durar should be planted four pounds per acre with five of alfalfa and when planted primarily for ground cover in the Northwest it should be planted at four pounds per acre with five pounds of crested wheatgrass.

Durar, given time, may be just as widely used and as well known as the other "AR" grasses--Mancher, Greenar, Latar, etc., developed at the USDA's Plant Materials Center at Pullman, Washington, in cooperation with Washington Agricultural Experiment Station.

(From UTAH FARMER - Vol. 81, No. 8, April 19, 1962)

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SERVICE is the RENT

we PAY for

the SPACE we occupy here on earth

